

# Informational Flow Mapping in Soybean Exportation Logistics Operation

Luciane Scheuer<sup>1</sup>, Elaine Cristina Lopes<sup>2</sup>, Thiago Wellington Balduino<sup>3</sup>

<sup>1</sup>Department of Administration – UNESPAR, Paranaguá (BRAZIL)

Email: [luciane.scheuer@unespar.edu.br](mailto:luciane.scheuer@unespar.edu.br)

<sup>2</sup>Department of Administration – UNESPAR, Paranaguá (BRAZIL)

Email: [elaine.lopes@unespar.edu.br](mailto:elaine.lopes@unespar.edu.br)

<sup>3</sup>Postgraduate researcher in Strategic Business Management - UNESPAR, Paranaguá (BRAZIL)

Email : [thiagobadu.21@gmail.com](mailto:thiagobadu.21@gmail.com)

**Abstract**— Nowadays, Brazil is one of the largest soy producers in the world and, considering the great demand for this product abroad, an efficient logistic operation is necessary for the removal, transportation, storage and exportation of the grains. In this context, the informational flow mapping that there is in these processes is an important tool able to provide support for the development of strategies. With a case study conducted in a sector trading company in Paranaguá - PR (Brazil), it was possible to carry out a survey of the entire logistics process and map relevant information from the beginning of the process until its end, thus enabling the identification of the informational flow between the logistics department and the other sectors of the organization.

**Keywords**— Informational flow; Logistics; Information; Soybean; Exportation.

## I. INTRODUCTION

According to the Brazilian Agricultural Research Corporation - EMBRAPA (Empresa Brasileira de Pesquisa Agropecuária) (2018), in the 2017 to 2018 harvest period, the world soybean production was around 336.699 million tons, and Brazil was the second largest producer with a harvest of approximately 116.996 million tons, the first one was the United States with a production of around 119.518 million tons. And a study presented by the Federation of Industries of São Paulo State - FIESP (Federação das Indústrias do Estado de São Paulo) (2019), it is estimated that Brazil ranks first in the period of 2019/2020 with a production of approximately 123.000 million tons, ahead of the USA, which has a perspective of 112.900 million tons in this same period.

The largest world consumer of soybean is China, due to the large swine farming and poultry activity, and this country receives around the 60% of the traded grain in the world. About 70% of Brazilian soybean is exported to the Chinese market, becoming main trading partner of Brazil, it is more than 20% of the Brazilian international trade (DALL'AGNOL, 2016).

With all this worldwide demand for the product linked to the great productive capacity of Brazilian agriculture, the flow of the Brazilian soybean harvest depends on an efficient logistic performance. In order to fulfill this

function with proficiency, the logistics department needs an efficient information management, because according to Carvalho *et al.* (2007), this contributes to operational control, planning and routine coordination, involving data from all company departments and also suppliers, customers and partners, as well as transportation, inventory control and product storage, disseminating information and enabling greater support for the company strategic management.

Given this scenario, this article presents the analysis of the informational flow of the logistics operation for soybean exportation carried out by a trading company, with a case study conducted in a multinational company that has been working in agribusiness for many years and has a large grain exportation capacity.

## II. BUSINESS INFORMATION FLOW

Information management aims to support the management of the companies with processes that make information and its articulation in all areas more efficient and accessible, so that way the knowledge creation is favored. The strategic management of information has as its main point the integration among sources, information systems, receiver and sender of information, considering the objectives and purposes of the organization both internally and externally (LOPES, 2010).

It turns out that for a company to be able to manage the information generated by its actions, it is necessary to know and to establish initially the existing information flow and what is better adapted to the company routines. For this flow to be established, it is need to map the existing information.

The informational flows may be formal or informal. In this sense, Lopes (2010) highlights that the formal flows have the origin in the company own structure, that is, routines and elements applied to the productive activities and may exist in registered and unregistered forms. The author points out that the information recorded goes through the formal systems of the company, “corporate portals, intranets, reports, records, documents containing rules and codes, among others.” It is also pointed out that the information comes in unregistered form through “meetings, courses and events formalized but not registered in any form of support”.

The informal flows, on the other hand, arise spontaneously, for example, through a meeting or even in conversations among the employees, being related to the intellectual structure of each individual who works in the company. It is important to say that these flows are usually an unregistered form because they are dialogues and non-formalized interactions among people and therefore not recorded in supports or systems (LOPES, 2010).

Valentim (2002) argues that it is possible to map these informal flows, just as it is possible to establish formal information flows, from the recognition of three environments. [...] The first one is linked to the organization chart, that is, the interrelationships among the different work units such as direction, managements, divisions, departments, sectors, sections etc.; the second one is related to the human resources structure, that is, the relations among people of the different work units and, the third and last one, is composed for the informational structure, that is, the generation of data, information and knowledge by the two previous environments (VALENTIM, 2002).

The existing information flows in the companies are naturally produced due to its activities and structural needs, that is, they are built by the individuals and areas from the activities, tasks and decisions that are being carried out (VALENTIM, 2010).

### III. LOGISTICS FOR EXPORTATION

According to Pontes *et al.* (2009), the plantations are concentrated mainly in the Midwest and South of Brazil, with farms far from the main exporting ports, a situation

that requires a great logistical structure to carry the grains from their origin to the destiny. It is important to highlight that all logistic infrastructure must be able to provide the distribution and storage of the crop, since the flow of the product is decisive and can affect agribusiness at its base, disrupting the operation, negotiation, pricing and even competition among the agents of the sector (OLIVEIRA, 2011).

Pais and Torres (2018) say that the most widely used mode of transportation for soybean harvest is the road one, with 47.6% of the production being transported by truck and 42.1% of the harvest being driven by trains and on a smaller scale, around 10%, across the country's rivers and lakes.

Brazil has more than 1.7 million kilometers of highways, which amplifies the use of roads, but 57% of this total has poor paving, according to a survey accomplished by the National Transport Confederation – CNT (Confederação Nacional de Transporte) (2018), which makes it one of the bottlenecks for the use of this type of transportation, being an obstacle to the lever of export logistics performance (FILASSI *et al.*, 2017). Other factors that causes disadvantages were found, including the fact that the costs of this mode are higher compared to other modalities and the transported volume is smaller, which ends up causing grain spillage during the transportation and considerable damage at the end of the process. Another point to be mentioned is the formation of huge lines and congestion at the port terminals and roads. Finally, the greatest risk of accidents and thieves (BIZERRA *et al.*, 2010; HIJJAR, 2004).

The intermodality is the transfer of the product from one mode of transportation to another, is an important outlet that has been used on an increasing scale in the recent years, as road transportation costs are higher than rail and waterway costs, it is natural that there is a substitution, and the trucks make the shortest route to a transshipment terminal, and the largest route is covered by trains or boats, ships (OJIMA, 2004).

According to Pontes *et al.* (2009), in addition to the transportation phase, the export logistics operations include the storage of the product and the performance at the ports. Regarding the origin, there are still few farms that have storage capacity for the product, which means that many producers have to transport the grain to a silo after harvest, generating a high cost.

As for the port terminal, many terminals have a reduced cargo storage and receiving capacity and require efficient control and planning in order to unload the

trucks and wagons. They need updated inventory and shipment scheduling for an efficient operation (CAMARGO and CUNHA, 2012).

According to Milan *et al.* (2010), ports encompass the entire port community, that is, the authorities established for the port management, the cargo agents, the shipping terminals and all those who perform direct or indirect operations inherent to the port activity. In a general context it has evolved at every stage, from simple product loading and unloading points to exportation infrastructure corridors to absorb every operation of a crop, but they need to evolve further to meet all the demand in the industry.

#### IV. THE IMPORTANCE OF INFORMATION IN THE EXPORTATION LOGISTICS OPERATIONS

In the current scenario, an organization logistics department not only deals with product transportation, but also produces information that is extremely relevant to all operation, to the other sectors of the organization as well as for the base of the strategic planning that should have solid data. According to Fleury *et al.* (2000), the economic evolution has been changing the managers' view on logistics, considering it a strategic tool and a competitive advantage, and is no longer considered a simple operational activity.

Regarding the logistic-port operations for exportation, some information is essential for the success of the operation, whether related to the operational part of the service, removal of the cargo from the supplier, which mode of transportation is most indicated, the terminal that will receive the product, the time to take away the products and the transit time, and also those information related to payment of government taxes and charges, expenses with service providers, as well as data of the port, ship, climate and transmission line conditions, whether road or rail (SORDI, 2005).

According to Bessa and Carvalho (2005), for an efficient logistic performance, it is important to emphasize the need to present quality data that can be transformed into reliable, non-outdated, accurate, fast and secure information, thus it is vital that the logistics department is integrated with other sectors of the company with a good Information Technology tool, which are able to assist in the inventory control, the cost reduction, the operational agility (minimizing manual processes), the quality control and reporting, in order to improve the communication with internal and external

partners and provide greater analytics capacity for threats and opportunities.

The lack of information, or its delay, and the problems generated in the logistics and port operations can directly impact in the product exportation process, it can lead to exponential costs and directly affect the end customer, and all agents that are part of the operation chain as ports, maritime agencies, warehouses, port authorities and governmental agencies that regulate international trade (SORDI, 2005).

Logistics comprises the planning activity, efficient transportation and the storage of products, as well as the information and associated activities, visualizing all the operation, from origin to destination, in order to satisfy the customer's needs. Thus, information technology and the data produced by it, become allies of the logistics operation that support the strategic definitions of organizations (SORDI, 2005).

#### V. METODOLOGY

This article was conducted as a case study, which, according to Jung (2004) is a research technique that analyzes a phenomenon inserted in a real scenario, especially when the boundaries between the phenomenon and the scenario are not evident. To collect the information, the observation method was used, which, according to May (2001), is the procedure in which the researcher interrelates, for a certain period of time, with the investigated in their routine activity, in order to technically understand the situation investigated.

#### V. CASE STUDY

##### 6.1 Characterization of the studied company

It is a multinational company, with facilities in several countries, and one of the largest agribusiness companies in the world, exporter of commodities, also called trading. According to Carvalho e Caixeta Filho (2007), tradings are organizations responsible for the negotiation of the products with international clients, and also for the transportation, from the purchase of the products to the shipment.

The studied organization started its operations in Brazil just over 20 years ago and has more than three thousand employees, besides other activities, it works in the exportation of corn, wheat, bran, oils and has the soybean as the main product commercialized, using the several freight transportation modes and exporting throughout Brazil ports from north to south, operating a large logistics structure to take these products to world markets.

The soybean handled by this organization in 2018, specifically in the port of Paranaguá, was around 687 thousand tons with the prospect of reaching one million tons in 2019 and growing even more in the coming years. According to the Administration of the Ports of Paranaguá and Antonina - APPA (Administração dos Portos de Paranaguá e Antonina) (2019), it is estimated that the Port of Paranaguá receives a volume of over 7.5 million tons of grains for unloading, and the soybean will be the main exported product with more than 4.7 million tons. The Porto of Paranaguá has a large operational capacity, joining its strategic location with one of the best port infrastructures in the Latin America, being the largest grain port on the continent and one of the largest port in general movement in Brazil, just getting behind the Port of Santos, in São Paulo and the Port of Itaguaí, in Rio de Janeiro.

## 6.2 Results

This paper aimed to map, from the perspective of information flow management, what are the main points inherent to the logistics processes within a company of the grains exportation sector, considering the beginning of the process, independent of the grain producer, until the end of logistic responsibility of delivering the product to the ship, pointing out the main strategic information related to each stage of the logistics process. In this sense, the presentation was categorized according to the logistic stage and its respective relevant information generated. It is also highlighted that it was considered both registered and unregistered information, and it was thus possible to identify the informational flow among the areas of the company.

The informational process of soybean exportation by the observed organization begins with the projection of the next harvest period. The company management makes a general mapping of the operation, with information gathered from all departments that participate in the soybean exportation process, such as logistics, inventory, controllership, trading and traders, gathering data from all operations and presents a market perspective for soybean handling volume. According to this study, it is organized the curve of the ships that will be made available and the operating costs with transportation, storage and purchase of the commodities. In possession of this information, the strategies for acting on soybean agribusiness and the volume to be exported by the Port of Paranaguá are defined, where logistics begins the informational and operational process of the grains flow, as follows.

The analysis of the results was categorized in the following order:

Category 1: Producer Output

Category 2: Transportation and the choice of modal

Category 3: Port Terminal

Category 4: Shipment Attendance

### 6.2.1 Category 1: Producer Output

At the moment of the product purchase is defined, in a contract, by the commercial department of the organization the information that will be passed to the logistics department about the local and the period of the cargo removal, the terminal where the products will be delivered and what will be the mode of freight. According to Maia (2007) the freight can be CIF (Cost, Insurance and Freight), where insurance and freight are contracted and settled by the supplier or FOB (Free On Board), where the products transportation, costs and risks are up to the buyer.

Freight mode information is essential for logistics, as it directly influences the way the department works; in the case of CIF freight, which corresponds to 30% of the volume, the logistics acts more in the control of information and deadlines, while in 70% of FOB freight, the logistics is responsible for conducting the entire operation, hiring single trucks to do the freight or using a road carrier and communicating by e-mail, passing all the necessary data for the product to be picked up and delivered according to the contract.

#### - The producer

The pickup locations, mostly, are from the Paraná State, around 80%, and also products produced in other states are purchased, such as São Paulo, Mato Grosso and Mato Grosso do Sul, according to APPA (2019), 72% of the soybean production exported by the Port of Paranaguá is produced by the State itself, another 10% come from Mato Grosso, 9% from Goiás, 3% from Mato Grosso Sul and around 2% come from Santa Catarina, São Paulo and other states. It is usually negotiated with producers or cooperatives that have been partners for several years, where the logistics department has knowledge of the farm location or warehouse where the soybean is stored and the route that will be used to transport the production, in the case of new suppliers, a survey is made on all information and registration in the company system.

#### - The product

Product quality assurance is essential, for this reason, a grading company is hired to analyze all purchased soybeans (ANEC standard 41), taking samples that identify the presence of impurities, moisture and broken



grains, damaged or burnt. This information is extremely important, because if the product has been removed with good quality, it must be transported, unloaded and stored in a way that guarantees the properties of the soybean. According to Anes (2003), some factors are important to ensure the quality of the products, such as proper storage and transportation, temperature control and cargo aeration.

#### - The modal

The transportation is carried out according to the characteristics of the operation and regarding the deadline of the ship attendance. As the farms do not have a railroad to remove the product, the grains are removed by trucks, then around 70% of the soybeans purchased by the multinational company studied is destined to a transshipment terminal, to travel by train to the port terminal, and the other 30% goes directly by truck to the Port of Paranaguá. The definition of the mode of transportation should be based on the type of product to be transported, the place of removal, destination and costs may directly influence the final price of the goods (BAHIA *et al.*, 2008). In this phase there is the alignment with the controllership and billing sectors of the organization, so that the products can transit with their respective notes, following the state and federal legislation.

#### - Deadline

The deadline for withdrawal of the product is defined in contract, but depending on the need, the logistics can speed this process to meet a ship that is about to dock or postpone for a period that does not compromise the pre-established time, because several factors are taken into consideration, such as the offering of wagons and trucks, availability of the destination terminal, delay or transfer of ships, moving to another terminal or port and non-ordinary situations such as strikes and stoppages.

#### - Climate issues

The visualization of the weather forecast is part of the daily logistics, as the rain can damage the product, so it is necessary to take all precautions when loading the product at the origin. Nowadays the silos where the soybean is deposited in the truck or the transshipment terminals (where they are placed in wagons), have cover and equipment to act in any weather condition, and also do not directly impact the transportation, since the product comes very well packed in the transportation mode which prevents the action of the weather, and if an incident occurs and the cargo is damaged or wet, it is

verified in the classification of the destination and the responsibility for the misfortune is ascertained.

### 6.2.2 Category 2: Transportation and the choice of modal

#### - The rail modal

For the rail freight, an annual service contract is made with RUMO, the company responsible for transporting on the railway network in the Southern of Brazil, which has a minimum tonnage movement, what should be very well observed by logistics, in order not to have extra cost if the minimum production is not reached. If the minimum quantity cannot be reached, it may be compensated in the following months, and the logistics must make this control and find ways to compensate for this shortage, since the calculation and collection is done at the end of the year. For the cases where there is a sufficient time to make the batch, it is preferable to transport on wagons where the cost is lower and there is the need to comply with the contract.

#### - The road modal

As this multinational company does not have its own fleet of trucks, truck carriers are quoted and hired to pick up the product from the producer's place and drive to a transshipment terminal or directly to the port terminal. Some carriers have greater relationship with the company, which facilitates the negotiation and the operation, as they are used to the company working methods. At this stage the information collected by the logistics department on the costs and quantity of vehicles that will be made available becomes a great differential for the choice of the transportation company. The preference for this kind of modal is related to the shipments that have a certain urgency, because their delivery time at destination has been faster than rail.

#### - Costs

According to the organization, the value of rail freight is between 15% and 20% more advantageous than the highway freight, essential information for the definition of the organization strategic planning. According to Bizerra *et al.* (2010) it is necessary to interconnect the transportation, the intermodality, to take advantage of the potential of the road modal that has more flexible access, but with high cost for long journeys, and the rail modal that has lower cost for long distances, but with restricted access.

One of the difficulties faced by the logistics department is the issue of stays, which increases operation costs that harms the profit of the exportation operation, and it can be generated in both road and rail

freight, due to the various logistical bottlenecks that exist in these transportation modals. In this way, delays in the unloading of the transported product become common, where the operational incapacity of the port terminals or the adversities of the harvest are very great, resulting in endless lines for the unloading of the transportation vehicles (JÚNIOR, 2017). Thus, it is up to the logistics department to effectively control the transit and waiting time of the trucks and wagons and to find ways to speed up the unloading process. This management is carried out through spreadsheet, information reports from the transportation companies and also through phone contact, seeking updated information in real time, which in the company studied has been very efficient, because the cases that generate stays are sporadic.

### 6.2.3 Category 3: Port Terminal

#### - The terminal choice

The choice of port terminal used some criteria, having some priorities, as it is a bonded place in the port primary zone, so the product is sent directly to the ship through the conveyor belts. The amount of fees charged per ton of soybean shipped; the available storage capacity; the rate of receipt of road and rail freight; the shipment capacity and the quality of service provided, are so priorities. This assessment was made by the logistics department and sent to the direction in order to evaluate with the other demands. In this case, the negotiation and formalization of a contract was authorized for 4 years.

#### -The reception of cargo by the terminal

For the terminal to receive the cargo that will be exported, it is necessary that the logistics department make the registration in the *Carga On-Line* system, which according to the Administration of the Ports of Paranaguá and Antonina - APPA, is an IT tool, which enables the scheduling and view, in real time, the number of wagons and trucks for unloading at Port of Paranaguá terminals, facilitating the access to the operational information such as: volume, traffic, unloading conditions and estimated forecast so that all the agents in the port chain are synchronized, to help in the transportation and logistics schedules of cargo, in order to organize the circulation of vehicles in the city and reduce the time spent in the port or the creation of trucks lines.

#### - Ship scheduling

The opening of quotas for registration in the system is conditioned to the ships scheduling, which are made after the announcement of each ship by the responsible Maritime Agency and following the

chronological order of arrival, this information is followed by the multinational logistics through line-ups, usually provided by the Maritime Agencies, that have information about all the ships that will arrive at the Port of Paranaguá. And based on this information will start all the logistic planning of the shipment of the product at the origin, quantity required, the appropriate modal and the deadline for attending the named ship. It is also at this stage that the organization inventory department should be synchronized with the logistics, presenting the updated information of the balance available for exportation, something that is not always possible, because the products are stored in third party terminals and the studied company system is updated only once a day, then the logistics have to make a projection of the current inventory plus the trucks or wagons that were coming or in unloading process to match the available volume.

#### - Control of the port internal logistics

Every day, when it is necessary, it takes place at the APPA head office in Paranaguá, the mooring meeting, which is organized by the public company and it is attended by the employees of the trading companies, maritime agencies, port and terminals operators, in order to coordinate all the logistics-port process, defining the ship scheduling, what are the next to dock and the availability of the batches that each exporting company has to board on a particular ship, this last information is essential and needs to be confirmed by the organization logistics department along with the terminal, because if the exporting company does not have enough cargo to board in the ship, it needs to wait in line for the arrival of the product until closing the batch, and this waiting time may lead to a demurrage (kind of fine), which may reach US\$ 25,000 a day of delay, according to Hijjar (2004) this over-stay is a fine paid by companies when there is some delays in the shipment of the ships, when it takes longer than what was formalized in the contract.

### 6.2.4 Category 4: Shipment Attendance

#### - Time of entrance and exit of the ship

The logistics department of the organization must be aware of the rules stipulated by the port authority for the line of ships, which today is with 18 ships and it has three modalities: normal, priority and super berth that according to APPA (2016) was recently created, and it allows the ship to dock at the port as soon as it arrives at the Paranaguá Bay, ahead of the other ones, but for this the ship has to fulfill some requirements, especially in completing the loading in a maximum time of 36 hours, in normal operations this period is of 48 hours, and every

12 hours it is evaluated the productivity of shipment in order to verify that the operation is within the required parameters, and the logistics should assess the viability of this modality, because this agility represents a great gain for the company, but the non-compliance of some requirement can be very damaging.

With the ship scheduled at the mooring meeting, the logistics department transmits the information of quantity, terminal and mooring date to the trading administration sector, which processes the entire customs clearance and the release of the cargo for shipment to the APPA, Internal Revenue Service (IRS) and Ministry of Agriculture, Cattle Raising and Supply – MAPA (Ministério da Agricultura, Pecuária e Abastecimento, according to the Ministry of Infrastructure (2017) through the Paperless Port – PSP (Porto Sem Papel), there is greater agility in the logistics port processes and in the form of products customs clearance, this information system aims at gather in a single tool the information management and documentation necessary to speed up the analysis and the release of goods in Brazilian ports.

#### - Weather issues

At this stage of the process, the weather is a very important point to be assessed by the logistics department, as the shipment of soybean on the ship cannot occur with rain, because the rain may wet and damage the cargo; and in periods of heavy rainfall it may delay the ship line and implicate the logistical planning that was being carried out. Then it should be re-evaluated in order to not have lack of space to receive the cargo at the terminal and extra stays due to the delay.

#### - Quality control

In order to carry on the shipment, a supervising company is hired to take samples of the soybean, perform the analysis and certify the quality of the grain or any non-conformity, informing any discrepancy in the results; MAPA also conducts cargo surveys, analyzing whether there is the need for fumigation of the grains due to the presence of insects, where for some destinations, including China, this procedure is mandatory and this cost is paid by the exporting company.

#### - Shipment completion

With the scheduled quantity shipped on the ship, with the required quality and on the required time, the informational and operational logistic cycle of soybean for exportation ends, under the aspect of the logistics department of the studied company, from this point on the responsibility for the cargo and the delivery of the goods

is by the ship charterer and the exporting company, at the end of the ship loading, it can make the presentation of the required shipping and negotiation documents, and thus receive the amount related to the product exportation.

#### 6.3 Interdepartmental Information Flow

Every day the logistics sector holds a conference, called production meeting, where all the employees of this area participate, and all the ports that the studied multinational operates in Brazil and in the countries of South America, with the purpose of verifying the daily development of what was planned, to observe possible bottlenecks and to analyze any type of deficiency in the operations, in this way, a general mapping of the logistic processes is done and if something is impacting the grain flow process.

As IT tools, the company has its own programs, being at least three different software used, one for payment control and financial management, other for the operational part of vehicles and cargo handling, and the third one for inventory control and billing. But much information that the logistics department needs and makes available is tracked through spreadsheets that are fed from information collected from the partners systems or through reports received by email.

The informational flow that the logistics area has with the other sectors of the organization is extensive and needs agile and accurate information. Then it can be observed the main information released among the company areas, in order to accomplish the soybean exportation in a very efficient way.

*Fig.1: Main information provided by logistics and received from other departments*

Departme nt	Provided Information	Received Information
Logistics X Juridical	All data from suppliers for analysis, scope of operation to be performed and trading data.	Contract with the supplier/ company that will be the service provider, clarification of contractual doubts and full legal instruction, giving support to the company so that it will not suffer future legal problems.

Logistics X Commercial	Data on the negotiation with the port terminals and transshipments, as well as with the rail and road modals, exemplifying for the commercial area the possibility of the operation with their respective costs.	Scheduling of the volume that will be moved, with their respective deadlines by batches; Freight mode, quantity and place of withdrawal of the product, sale of ships (curve) with its monthly and annual schedule.
Logistics X Stock	Daily stock map and volume schedule to be moved daily, total cargo in transit, ship scheduling, completion of ships boarding to write off the stock.	Daily report of terminals and volume of products that is available for exportation, number of branches used to board the ship.
Logistics X Financial	Report describing the movement of the volumes with values, sending invoices for service provision for payment scheduling.	Request for approvals for expense payments, amounts paid, open payments.
Logistics X Billing	Instructions related to rail and road operations, aligning the procedure for issuing invoices for each type of transportation.	Synopsis and copies of invoices issued for tax coverage and attendance of cargo transportation.
Logistics X Trading Administration	Date of arrival and mooring of the ship (line up position); programming at a meeting with APPA; distribution of volumes and exporters by	Release of the documentary part of the ships for boarding with APPA and consenting agencies; instructions on how agents and operators should proceed in issuing shipping documents, any

	terminal; exchange information FOB, shipment completion and cargo shedding, if necessary.	information that can affect the boarding of the ship.
Logistics X Controller ship	Volume handled by the transshipments and port terminals, with their respective costs, scope of all operations, information for auditorship.	Analysis of how the operations are being performed in the financial part, ie., the planned and what was performed; and taxes, mainly related to taxes and taxes laws, accounting control and information that fully support the operation.
Logistics X Work Safety	Immediate reporting of any accident or incident occurred with employees or contractors; ensuring that instructions are sent to partner companies in order they to follow company safety standards, particularly related to transportation and defensive driving.	Safety information for operations; Accident and incident index, instructions for analyzing and avoiding all types of risk.
Logistics X IT Department	Reporting of system problems; software adequacy requests to fulfill the operations.	Clarification of doubts and treatment of systemic problems; digital security information.
Logistics X Company Direction	Possibilities of new business and volumes, for feasibility studies of the operation; operational costs of transportation and storage;	Authorization or not for the realization of the business and the operational design of how the project will be executed, the establishment of goals and support for the logistics department



	prospection of new markets, products and partners, the progress of operations and whether targets are being met, comparative with other ports, performance of operations and process failures, as well as all the information needed to plan the strategy for action in the next harvest.	to have full autonomy in order to perform its functions.
--	---	--

Source: Authors (2019)

## VI. CONCLUSION

After the analysis of the information obtained with the participative observation of the logistics department of the studied company, it was possible to identify all the informational flow that permeates the exportation process of the soybean commercialized by this multinational company, from the beginning of the logistic activity of product withdrawal from the farm to the end of the logistical responsibility of soybean delivery on board the ship.

Some information that is extremely relevant to the process, such as location and access to the producer, the quality of the product purchased, weather issues that may affect the product and delay the shipment time, the period of withdrawal and delivery of the product in the terminal, the kind of freight and the transportation modal and the costs that directly influence the strategic planning of the organization were highlighted. And related to the capacity of the shipping terminal and the accuracy of inventory control, as well as the compliance with port rules and ship scheduling analysis in order to avoid unnecessary spending and direct the logistics department work routine were also taking in consideration.

It can be observed the efficient management of informational flow throughout all the soybean exportation process, since all departments involved in the operation make direct and accurate communication through specific e-mail groups where each issue is directed to the respective responsible and also through shared folders,

informative reports and the movement panel available at the local office in Paranaguá, transferring information that ensures the quality of the operation and reduces the risks inherent to the process, allowing the visualization of possible improvements in the operation and it also helps in the identification of failures that could hinder any step in the process.

It was possible to observe some inconsistencies in the IT tools that the organization has, since several information control softwares are used, which may complement each other, but it end up being very dispersed and need some dealings so that they can become relevant, and also, there is a lot of manually entered information in spreadsheets that are important to the operation but highly susceptible to mistakes. According to Bessa and Carvalho (2005), the information technology provides some advantages when integrated with logistics, such as support for operations, facility and agility in obtaining information, data reliability, providing greater basis for strategic definitions and decision making.

## REFERENCES

- [1] ADMINISTRAÇÃO DOS PORTOS DE PARANAGUÁ E ANTONINA – APPA. Carga On-Line. Retrieved from: [http://www.sistemas.appa.pr.gov.br/appa/Help/Oque\\_e\\_Carga\\_on\\_line.htm](http://www.sistemas.appa.pr.gov.br/appa/Help/Oque_e_Carga_on_line.htm).
- [2] ADMINISTRAÇÃO DOS PORTOS DE PARANAGUÁ E ANTONINA – APPA. Com novo sistema de atracação, Porto reduz tempo de carregamento de grãos. Retrieved from: <http://www.portosdoparana.pr.gov.br/modules/noticias/article.php?storyid=1550&tit=Com-novo-sistema-de-atracacao-Porto-reduz-tempo-de-carregamento-de-graos>.
- [3] ADMINISTRAÇÃO DOS PORTOS DE PARANAGUÁ E ANTONINA – APPA. Movimentação de cargas terá ritmo mais intenso nesta safra. Retrieved from: <http://www.portosdoparana.pr.gov.br/modules/noticias/article.php?storyid=1905>.
- [4] ANES, C. E. R. Efeito do transporte e da qualidade da armazenagem no custo da soja na Região das Missões do Rio Grande do Sul. Universidade Federal do Rio Grande do Sul. Centro de Estudos e Pesquisas em Agronegócios. Programa de Pós-Graduação em Agronegócios. Porto Alegre-RS, 2003
- [5] BESSA, M. J. C.; CARVALHO, T. M. X. B. Tecnologia da informação aplicada à logística. Rev. Cent. Ciênc. Admin., Fortaleza, v. 11, n. especial, p. 120-127, 2005.
- [6] BIZERRA, R. C.; *et al.* A Logística do Mercado Brasileiro Exportador de Soja. VII Simpósio de Excelência em Gestão e Tecnologia, 2010.

- [7] CAMARGO, P. V.; CUNHA C. B. Um modelo híbrido simulação-otimização para análise de capacidade de um sistema de transporte ferroviário de grãos agrícolas em ciclo fechado. *Journal of Transport Literature*, v. 6, n. 2, p. 33-65, 2012.
- [8] CARVALHO, L. B; CAIXETA FILHO, J. V. Comportamento do mercado de preços de frete rodoviários de açúcar para exportação no Estado de São Paulo. São Paulo. *Revista de Economia e Agronegócio*, V. 05, p. 101-125, 2007.
- [9] CARVALHO, R. B; OLIVEIRA, L. G; JAMIL, G. L. Gestão da Informação Aplicada à Logística: Estudo de Caso de uma Grande Agroindústria Brasileira. VIII ENANCIB – Encontro Nacional de Pesquisa em Ciência da Informação. Salvador-Bahia de 28 a 31/10/2007.
- [10] CONFEDERAÇÃO NACIONAL DO TRANSPORTE – CNT. Pesquisa CNT de Rodovias. Retrieved from: <http://pesquisarodovias.cnt.org.br/>.
- [11] DALL'AGNOL, A. A Embrapa Soja no Contexto do Desenvolvimento da Soja no Brasil: Histórico e contribuições. 1ª ed. Brasília: Embrapa, 2016.
- [12] EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA – EMBRAPA. Soja em números (safra 2017/2018). Retrieved from: <https://www.embrapa.br/soja/cultivos/soja1/dados-economicos>.
- [13] FEDERAÇÃO DA INDÚSTRIAS DO ESTADO DE SÃO PAULO – FIESP. Safra Mundial de Soja 2019/20. Retrieved from: <https://www.fiesp.com.br/indices-pesquisas-e-publicacoes/safra-mundial-de-soja/attachment/file-20190516192608-boletimsojamaio2019/>.
- [14] FILASSI, M.; OLIVEIRA, A. L. R.; MAKIYA, I. K. Logística de exportação da soja brasileira: uma avaliação do corredor intermodal Centro-Norte. *Revista Espacios*, Vol. 38, Nº 07, Pág. 20, 2017.
- [15] FLEURY, P. F.; WANKE, P.; FIGUEIREDO, K. F. Logística Empresarial: a perspectiva Brasileira. São Paulo: Atlas, 2000.
- [16] HIJJAR, M. F. Logística, soja e comércio internacional. Centro de Estudo em Logística. COPPEAD, UFRJ, Rio de Janeiro, 2004.
- [17] JUNG, C. F. Metodologia para Pesquisa e Desenvolvimento. 3. ed. Porto Alegre: Axcel Books, 2004.
- [18] JÚNIOR, M. M. B. O Regime Jurídico da Estadia no Contrato de Transporte Rodoviário de Cargas. Trabalho de conclusão apresentado à Escola de Direito de São Paulo, da Fundação Getúlio Vargas, como requisito para obtenção do título de Mestre em Direito, 2017.
- [19] LOPES, E.C. Governança corporativa em empresas de capital aberto: uma contribuição da Ciência da Informação para a análise da informação estratégica. Marília: UNESP, 2010. 153f. Dissertação (Mestrado) – Programa de Pós-graduação em Ciência da Informação – Faculdade de Filosofia e Ciências – Universidade Estadual Paulista (UNESP) - Marília, 2010.
- [20] MAIA, J. M. Economia internacional e comércio exterior. 11. ed. São Paulo: Atlas, 2007
- [21] MAY, T. Pesquisa Social. Questões, métodos e processos. Porto Alegre: Artemed, 2001.
- [22] MILAN, G. S. et al. A proposição de um modelo conceitual em torno da prática da governança em clusters portuários. VII SEGeT – Simpósio de Excelência em Gestão e Tecnologia, 2010.
- [23] OLIVEIRA, A. L. R. O Sistema Logístico e os Impactos da Segregação dos Grãos Diferenciados: Desafios para o Agronegócio Brasileiro. Tese de Doutorado. UNICAMP, 2011.
- [24] PAIS, J. M., TORRES, C. E. G. Logística de Transportes e Expansão da Produção de Soja no Centro Oeste. *Rev. Econ. do Centro-Oeste, Goiânia*, v.4, n.2, pp. 21-38, 2018.
- [25] PONTES, H. L. J.; CARMO B. B. T.; PORTO A. J. V. Problemas Logísticos na Exportação Brasileira da Soja em Grão. *Revista Sistemas & gestão*, v. 4, n. 2 p. 155-181, 2009.
- [26] SORDI, J. O. Otimização de Processos Portuários a Partir da Aplicação de Recursos de Tecnologia da Informação Análise do Porto de Santos. *eGesta - Revista Eletrônica de Gestão de Negócios - ISSN 1809-0079*. v. 1, n. 2, jul.-set./2005, p. 63-84, 2005.
- [27] VALENTIM, M. L. P. Inteligência competitiva em organizações: dado, informação e conhecimento. **DataGramZero**, Rio de Janeiro, v.3, n.4, ago. 2002. Retrieved from: [http://dgz.org.br/ago02/Art\\_02.htm](http://dgz.org.br/ago02/Art_02.htm).
- [28] VALENTIM, M. L. P. **Ambientes e fluxos de informação**. São Paulo: Editora UNESP, 2010.